

Type B
Investigation Board Report
on the June 19, 1997,
Occupational Illness
at the Y-12 Plant
Oak Ridge, Tennessee



Oak Ridge Operations
U.S. Department of Energy

Final Report

Type B Investigation Board Report on the June 19, 1997, Occupational Illness at the Y-12 Plant Oak Ridge, Tennessee



**Oak Ridge Operations
U.S. Department of Energy**

This report is an independent product of the Type B Investigation Board (Board) appointed by James C. Hall, Manager, Oak Ridge Operations.

The Board was appointed to perform a Type B Investigation of this incident and to prepare an investigation report in accordance with U.S. Department of Energy Order 225.1, "Accident Investigations."

The discussion of facts, as determined by the Board, and the views expressed in the report do not assume and are not intended to establish the existence of any duty at law on the part of the U.S. Government, its employees or agents, contractors, their employees or agents, or subcontractors at any tier, or any other party.

This report neither determines nor implies liability.

On October 22, 1997, I established a Type B Accident Investigation Board (Board) to investigate the Lockheed Martin Energy Systems, Inc. (LMES), employee concern related to June 19, 1997, Occupational Illness at the Y-12 Plant in Oak Ridge, Tennessee. The Board's responsibilities have been completed with respect to this investigation. The analysis process, identification of contributing and root causes, and development of judgments of need during the investigation were done in accordance with U.S. Department of Energy Order 225.1, "Accident Investigations." I accept the findings of the Board and authorize the release of this report for general distribution.

James C. Hall
Manager
Oak Ridge Operations

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ACRONYMS

BSE	Building Service Employee
DOE	Department of Energy
EMT	Emergency Medical Technician
FMO	Facilities Maintenance Organization
LMES	Lockheed Martin Energy Systems
MIR	Medical Incident Report
MORT	Management Oversight Risk Tree
MSO	Maintenance Shift Operations
PSS	Plant Shift Superintendent
SIR	Supervisor's Incident Report

EXECUTIVE SUMMARY

INTRODUCTION

An occupational illness at the Y-12 Site resulting in a five-day hospitalization was investigated. In conducting its investigation, the Type B Investigation Board (Board) held extensive interviews with employees, line management (chain of command), Medical and Safety and Health personnel; reviewed circumstances surrounding the illness and pertinent medical records; analyzed company policies and procedures; and examined a variety of work locations to determine the factors that contributed to the illness. Management systems were evaluated for their effectiveness in addressing the employee's concerns. The Board used various analytical techniques, including barrier analysis, change analysis, mini-Management Oversight Risk Tree (MORT), and tier diagramming. The Board found evidence of violation of 29 CFR 1904(a)(2), which requires a log entry of an occupational illness within six working days after receiving information of such an occurrence. DOE Order 231.1, Environment, Safety, and Health Reporting, further clarifies the illness/injury reporting process.

BACKGROUND

On June 19, 1997, a 62-year old building service employee (BSE) suffered a near syncope (a faint or a swoon) and uncontrolled hypertension during her routine work assignment. She was taken by ambulance to the local emergency room from which she was admitted to the hospital, remaining there for five days. The employee was off work for 18 calendar days. The employee had several medical conditions and was working with medical restrictions. Prior to the incident, the employee had expressed concerns to her management that her job assignment was not within her restrictions. Management was aware of her concerns and responded; however, their approach was simplistic and incremental. The incident had not been classified as work-related. The issue came to the attention of DOE through an Employee Concern filed by the worker.

CAUSAL FACTORS

The Board identified a single root cause for the incident. However, because of the nature of the illness, combined with other medical conditions, and the uncertain effectiveness of specific preventive measures, there is no certainty that the elimination of the root cause would have prevented this illness. The identified root cause is:

- Management did not recognize the extent of the employee's concerns.

In addition, seven contributing causes that affected management responsiveness and may have increased the likelihood of the incident without individually causing the incident were identified:

- Not fully understanding employee's health conditions

- Permanent medical restriction terminology
- Job changes
- Work conditions
- Confusing and intermingled health issues and job assignments
- Management team communication
- Management response to employee's issues

A discussion of the contributing causes appears in Table 2.3.

CONCLUSIONS AND JUDGMENTS OF NEED

Table ES-1 presents the conclusions and judgments of need determined by the Board. The conclusions are those the Board considered significant and are based on facts and pertinent analytical results. Judgments of need are managerial controls and safety measures believed by the Board to be necessary to prevent or minimize the probability or severity of a recurrence of this type of incident. Judgments of need are derived from the conclusions and causal factors and are intended to assist managers in developing follow-up actions. Based on the investigation, there were no actions on the part of DOE that could have prevented the incident or added value after the fact.

Table ES-1. Conclusions and Judgments of Need

Conclusion	Judgments of Need
<p>1. The management team, including expert staff resources (Medical, Safety and Health, Human Resources, etc.) did not work well together and with the employee to understand and address the employee’s concerns adequately.</p>	<p>Lockheed Martin Energy Systems (LMES) needs to ensure that plant policy and general practice result in timely line management involvement of expert staff resources (Medical, Safety and Health, Human Resources, etc.) and affected employee in dealing with complex employee issues (e.g., nonspecific medical restrictions, employee concerns not reaching timely resolution).</p>
<p>2. The employee had various medical restrictions and had previously worked in a single location for three to four years before being reassigned twice in two weeks. Medical conditions, new work assignments, and summer conditions all combined to create a confusing and intermingled set of issues.</p>	<p>When anticipating change and before multiple issues arise, LMES management needs to recognize and require early and frequent communications between affected employee and the management team.</p>
<p>3. The employee had significant medical problems that directly affected her work capability. This information was not adequately communicated by Medical to responsible line managers.</p>	<p>LMES Medical Department policy should require sufficient and timely information be provided to line management for individuals with complex medical issues. Non-specific medical restrictions involving these individuals should require direct discussions among line management, Health Services, and the employee.</p>
<p>4. Current guidelines (SH-170PD and “Quick Response Guide”) and practices for completing the Medical Incident Report (MIR) do not ensure that all potential occupational injuries and illnesses are properly submitted for classification.</p>	<p>LMES criteria for initiating an MIR need to be clear, understood, and consistently implemented by all those affected.</p>

Type B
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on the June 19, 1997,
Occupational Illness at the Y-12 Plant
Oak Ridge, Tennessee

1.0 INTRODUCTION

1.1 BACKGROUND

On June 19, 1997, at approximately 7:00 p.m. at the Y-12 Plant, a janitor, feeling that she was very hot, was overcome at work and collapsed to the ground. She was taken for treatment by the Y-12 Emergency Response Team (EMT) to the local emergency room, where she was admitted for a near syncope and hypertensive crisis. The employee was hospitalized five days for treatment of uncontrolled hypertension and tests to determine whether there were further complications. She was released from the hospital on June 24, 1997. She was evaluated by her private physician and returned to work on July 8, 1997.

The employee had several medical conditions dating back a number of years and was on various medicines which are taken on a prescribed schedule. These medical conditions resulted in temporary and permanent medical restrictions placed on her work. Her line management was aware of the restrictions, which were evaluated when work assignments were made. The employee was concerned that the most recent assignment required her to work outside the restriction of "cannot work in hot environments for extended periods - avoid heat stress situations," and she expressed this concern to her management both before and after the incident. These concerns were still not adequately addressed upon her return. The employee filed a grievance on September 10, 1997, and a Department of Energy (DOE) Employee Concern on October 1, 1997.

It was through the employee concern system that the described occupational illness was brought to the attention of DOE. The processes and mechanisms that are used by LMES to classify an injury/illness as occupational were not engaged, due to a decision made by the Site emergency response and Health Services organizations that the incident was related to her personal condition and not to the work. Therefore, the classification of the incident within the six days as required by DOE Order 231.1 was preempted.

On June 19, 1997, at about 7:00 p.m., a janitor, feeling that she was very hot, was overcome at work and collapsed to the ground.

The employee had several medical conditions that resulted in temporary and permanent medical restrictions.

Initially, the incident was thought to be related to her personal condition and not to the work.

1.2 FACILITY DESCRIPTION

The Y-12 Site is located on the Oak Ridge reservation and is managed by LMES. The Y-12 Plant was constructed as part of the Manhattan Project in 1943. The primary mission of Y-12 has been to support the Department of Defense in manufacturing of nuclear weapons components. Current mission activities are focused on manufacturing and reworking of nuclear weapons components returned from the national arsenal, storing special nuclear materials, and providing special production support to DOE programs. The facilities involved in this investigation are located in the east end of the Y-12 Site, inside the controlled area.

Building 9720-6 is a maintenance shop facility with office space, break areas, and rest rooms. The bulk of the building is a large open shop area that is not air conditioned. There are four break rooms, two main office areas, and a men's change room that are air conditioned. One men's rest room on the main floor is not air conditioned. The shop contains work areas for carpenters, machinists, and welders. The shop is open and staffed during the day shift and open but not staffed during the evening shift; however, janitorial supervisors frequently walk through the area en route to and from their offices.

Building 9720-6 is a large standard industrial maintenance shop and block of offices.

1.3 SCOPE, PURPOSE, AND METHODOLOGY

The Board began its investigation on October 21, 1997. An employee concern to DOE initiated a review indicating that the illness was occupational in nature. This categorization and the five-day hospital stay resulted in the formation of the Type B Investigation Board.

The Type B investigation began on October 21, 1997.

The **scope** of the Board's investigation was to analyze causal factors and identify root causes that resulted in the incident and to determine judgments of need to prevent recurrence. The Board was also to focus on management roles and responsibilities, application of lessons learned from similar incidents within the DOE, and work planning, practices, and procedures. The issues raised in the employee's concern were also to be addressed.

The **purpose** of this investigation was to determine the cause of the incident, including deficiencies, if any, in the safety management systems and to assist DOE in understanding lessons

The investigation was to determine the cause of the incident.

learned to improve safety and reduce the potential for similar incidents.

The Board conducted its investigation using the following **methodology**:

- Facts relevant to the incident were gathered through interviews, document reviews, and “walkdowns” of facilities. The incident happened four months prior to the formation of the Board. Therefore, the Board could not verify the physical conditions or conduct interviews with other workers in the facility concerning the building temperatures, door configuration, etc., within a few days of the occurrence, except as they were remembered.
- Event and causal factors charting, change analysis, barrier analysis, and mini-MORT techniques were used to analyze facts and identify the incident’s cause.
- Based on analysis of the information gathered, judgments of need for corrective actions to prevent recurrence were developed.

Event and causal factors charting, change analysis, barrier analysis, and mini-MORT techniques were used to determine judgments of need for corrective actions.

2.0 FACTS AND ANALYSIS

2.1 INCIDENT DESCRIPTION AND CHRONOLOGY

2.1.1 Background

On April 28, 1997, Y-12 Site evening shift janitorial runs (work assignments) were changed to accommodate a customer’s preference for all-day shift custodial service. Because of her preference to remain on the evening shift, the concerned employee was moved to a different run in the Biology complex on April 28, 1997. When assigned to Biology, the employee carried with her one permanent medical restriction. The permanent restriction was “cannot work in hot environments for extended periods - avoid heat stress situations,” dated 07/18/95. The resulting move led the employee to seek medical guidance regarding the handling of broken glass and the climbing of stairs on the newly assigned run. Due to previous and ongoing medical conditions and the taking of prescription medication, the employee was placed on additional medical restrictions. The temporary restriction was “minimize use of stairs (no more than 1 flight in a normal work period and not to handle glassware in plastic bags),” dated 05/02/97, reevaluation—three months.

Employee changed job assignments three times within a two week period.

Employee carried medical restrictions that could limit her work assignments.

These restrictions led to another change of the employee's janitorial run. The resulting assignment on May 9, 1997, was to clean portions of Building 9720-6 and Building 9702-1. Line management remained constant.

The new assignment in 9720-6 consisted of three office areas, two break/lunch rooms, a shop area, and a men's rest room adjacent to the shop. The main office area is comprised of approximately 20 offices and cubicles and two small bathrooms. A second office area, Maintenance Shift Operations (MSO), is comprised of two small cubicles and a small break area. The third office area consists of four small cubicles. These office spaces and the two break/lunch rooms are air conditioned. The shop area and the men's rest room are not air conditioned. The required janitorial duties in all of these areas consist of pulling/emptying trash, sweeping and mopping floors, and cleaning and stocking the rest rooms.

The shop area in Building 9720-6 is a composite of several different craft areas. The janitorial services required in the shop consisted of pulling the trash and sweeping the center aisle.

Job duties that are required on a daily basis are the cleaning and restocking of rest rooms. All other duties are done on an as-needed basis or as manpower will allow.

The other building in this run is the 9702-1 communications building, which is airconditioned. This is a two-story building consisting of approximately eight occupied offices and four small rest rooms. Janitorial service is provided every other day.

When assigned to 9720-6 and 9702-1, the employee carried with her the one permanent medical restriction and the temporary restriction. Line management was aware of these restrictions and thought the janitorial run was compliant. The employee was told by first-line supervision and other levels of management to stay within her restrictions.

As the weather got warmer, the employee approached her first-line supervisor, concerned that areas of her run were too hot. The supervisor relayed the information to the general supervisor. Both supervisors felt that the employee's run did not meet the definition of a conventional heat stress environment, but that she should take breaks from her work whenever the need arose. The employee was told to take breaks in cool areas whenever she got too hot.

New job assignment consisted of both air-conditioned and non-airconditioned space.

Employee raised concern to management that areas were too hot. Management advised breaks in cool areas.

On June 6, 1997, the employee approached her division director in his office in 9720-6. She told him that she had certain medical conditions, had medical restrictions, was taking a variety of medications, and was susceptible to heat. She told him she was having trouble walking from the parking lot to the change house to 9720-6. The division director communicated these to lower management and requested that they be addressed.

Through the efforts of her first-line supervisor, the employee was returned to the Biology change house, where closer parking and transportation to 9720-6 were available. The 9720-6 area was reviewed by line management and they determined that the area did not contain elements of a conventional heat stress environment. These actions took place soon after June 6.

Interviews indicate that the employee brought up the issue of being too hot to her supervision about four to five times from the first part of June until the day of the incident, June 19, 1997. She was directed to take care of herself and take breaks at any time to avoid getting too hot.

2.1.2 Incident Reconstruction and Description

Because the investigation began more than four months after the incident, details of the incident vary.

On the day of the incident, the employee reported to work. She states that she cleaned the main office area, including the bathrooms and men's rest room, and pulled the trash from the shop area. She was in the process of carrying the trash from the office area toward the outside dumpster, when she began to feel ill. At this time, another evening shift supervisor entering the hallway asked how she was doing. The employee replied that she wasn't doing well, at which point the supervisor took one of the trash bags from her and they exited the building. As they separated to go around a vehicle, the employee called for help and slumped to the ground.

At that time, another BSE was exiting the building. The supervisor told him to call the plant shift superintendent (PSS). An ambulance was dispatched at 1912 hours.

2.1.3 Chronology of Events

Figure 2.1 summarizes the chronology of significant events.

Arrangements were made for employee to drive to 9720-6.

Employee continued to express concerns of being too hot.

Employee was not feeling well and slumped to the ground.

Ambulance was dispatched.

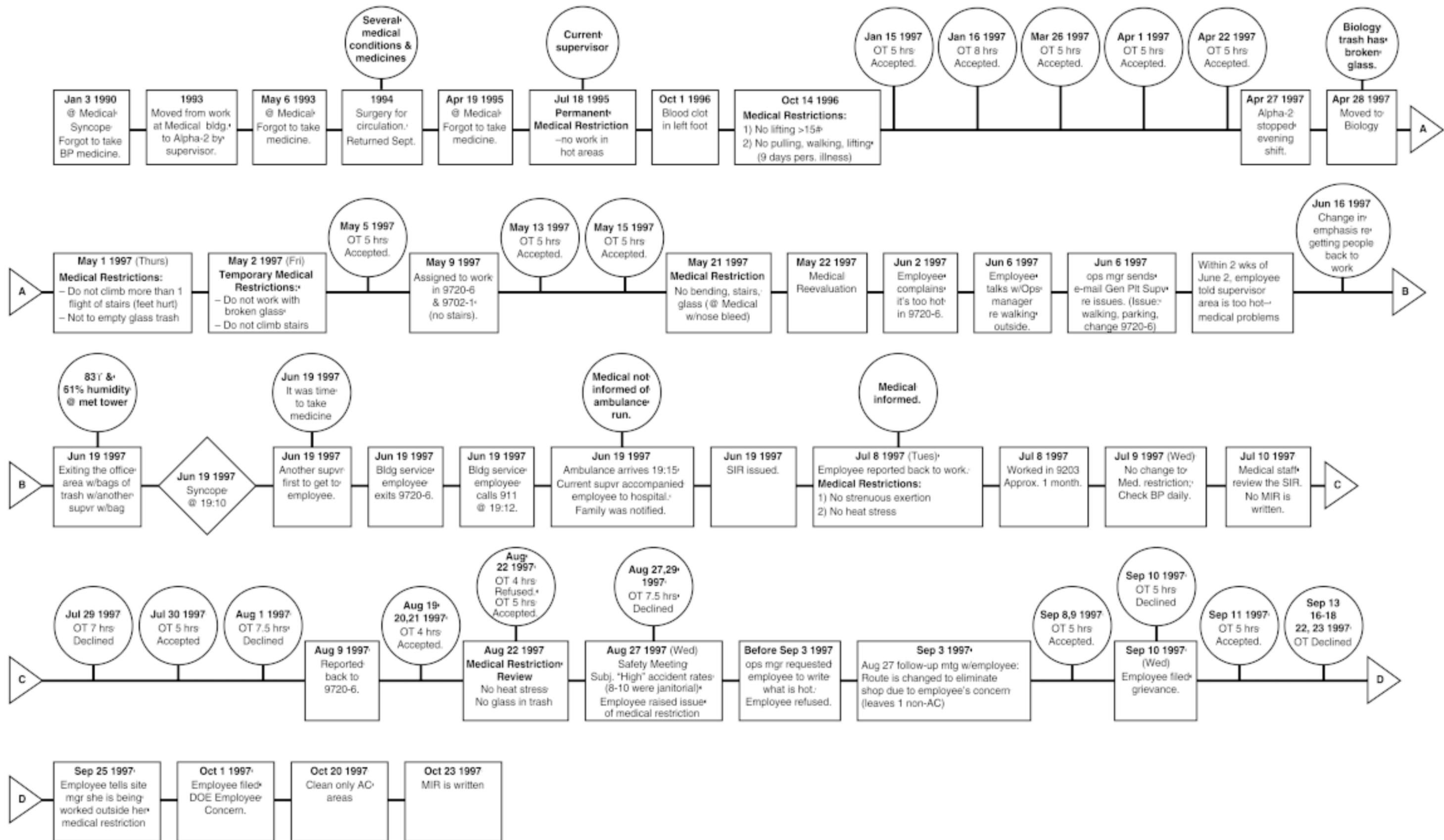


Figure 2.1. Summary Events Chart and Accident Chronology

2.1.4 Emergency Response and Investigative Readiness

The PSS was notified at 1912 hours, and an ambulance and three emergency medical technicians (EMTs), who are members of the LMES Y-12 Fire Department, arrived on the scene at 1915 hours.

The employee was conscious and stated to the supervisor present that she “forgot to take her medicine.” It was not clear whether she meant that she had forgotten to take it out of her car or whether she had forgotten to take it on time. (Medical staff does not believe that a missing or delayed dose of medicine would have had an effect on the hypertension episode.) The attending EMT gathered answers to questions concerning what had happened, whether she had any allergies, whether this had happened before, and what was wrong then. She was readied for transport, vital signs were taken, and an IV was attempted. The employee was taken to the local hospital emergency room, where she was examined and admitted. Health Services was not informed of the ambulance run, as required.

Due to the nature of the incident, an assumed absence of occupational involvement, and the fact that the employee sustained no injury, the contractor did not recognize the need for preservation of the scene or for an investigation. An individual Accident/Incident Report, DOE Form 5484.3 (commonly referred to as a Supervisor’s Incident Report, SIR), was completed by the first-line supervisor on June 19, 1997, and reviewed and signed by the safety engineer on July 2, 1997. It was only after the employee filed a DOE Employee Concern that the incident was found to meet the criteria for a Type B investigation.

2.1.5 Medical Analysis

The employee returned to work after five days of hospitalization and a total of 18 days off work. She reported to the site Health Services and was seen by a registered nurse and a physician’s assistant. Health Services received an emergency room note and the release from her private physician to return to work. The employee was alert and oriented and returned to work with the restrictions of “no prolonged or strenuous exertion and no work in hot environments (no heat stress work).” The employee was advised to return the next day for a blood pressure check and to see how the back-to-work status was tolerated.

Employee remained conscious, was transported to hospital, and was admitted.

Illness was not recognized as occupational.

Employee returned to work after 18 days off.

The medical director who reviewed the situation decided that, due to the hospital diagnosis and the preexisting medical condition, a Medical Incident Report (MIR) was not needed at that time; however, on October 23, 1997, an MIR was written.

MIR was not initiated.

2.2 MANAGEMENT SYSTEMS AND CONTROLS

Management systems and controls are utilized by LMES to conduct Site janitorial services, the occupational medical program, and the safety and health program.

2.2.1 Facility Maintenance Organization (FMO) Management Systems

Policies and Procedures

Policies and procedures relevant to this investigation are:

- Y-12 Procedure Y10-35-001, “Maintenance Program and Work Management Administration”
- Y-12 Procedure Y10-35-122, “Overtime Distribution, Facilities Maintenance Organization (FMO)”

The organization for FMO shown in Fig. 2.2 depicts the janitorial services group under general plant services. The janitorial group includes approximately 100 people divided evenly between day and evening shift. The routine janitorial duties include emptying trash, sweeping, vacuuming, and cleaning and stocking bathrooms. Stripping/waxing floors and other heavy-duty cleaning are done on overtime. Overtime work is assigned based on a combined list that includes both janitors and laborers. During the last few years, the number of janitors has been reduced and there continues to be high turnover in the janitor organization. Individual workloads have increased because of attrition. Adjustments to individual work scope assignments has resulted in an environment of frequent change.

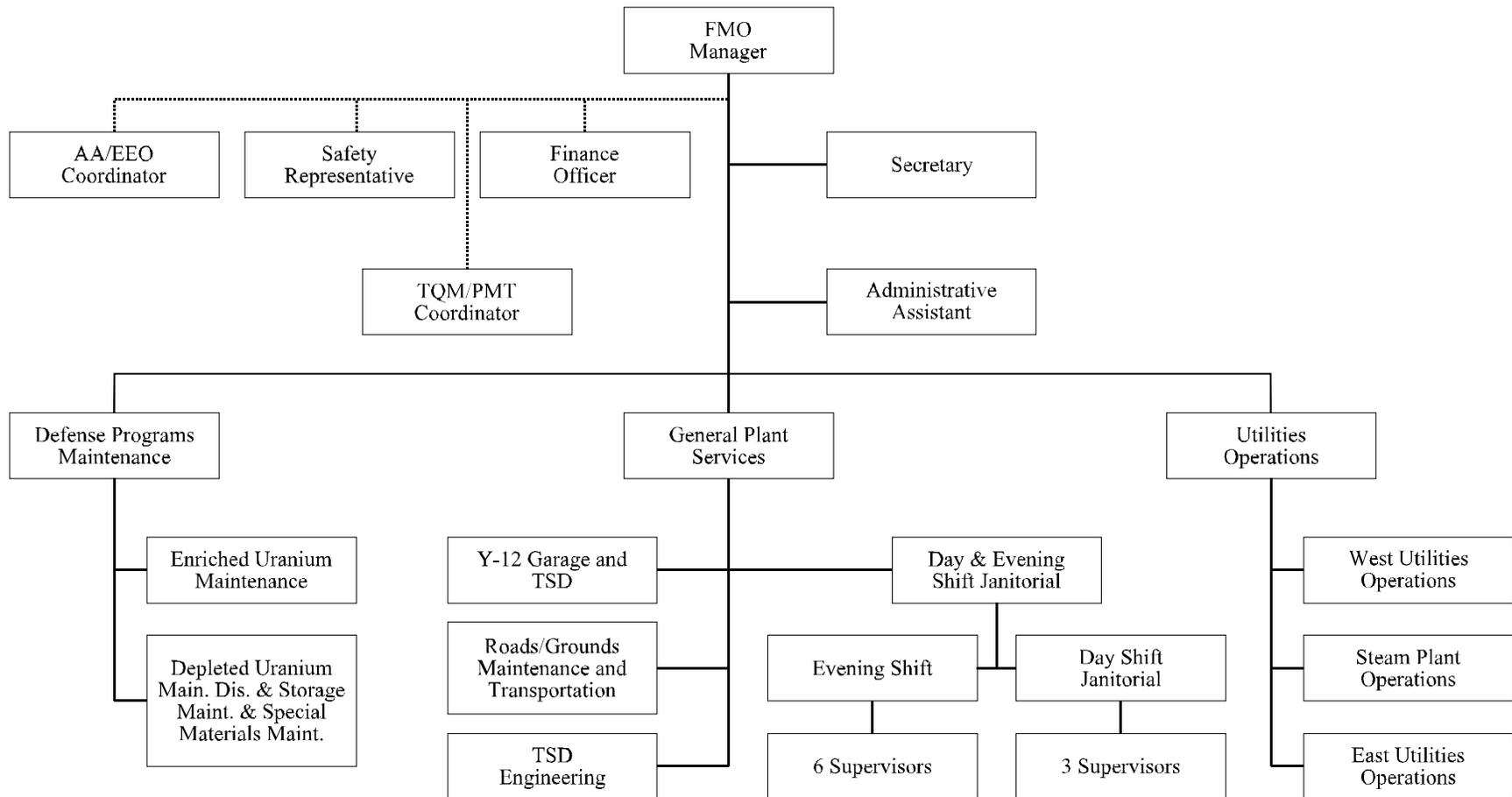
Janitorial duties are emptying trash, sweeping, vacuuming, cleaning and stocking bathrooms.

Janitors experience an environment of frequent change.

Evening shift supervisors will generally stop by the workplace and discuss job issues with each member of their crews once or twice during each shift. Various job-related issues (scope of job, overtime, medical restrictions, etc.) are raised by either the individual janitor or the supervisor and are discussed. The evening shift general supervisor is responsible for all the evening shift janitorial crews. He visits various work sites and talks with janitor crew supervisors to understand and resolve

Management roles and responsibilities are understood.

Figure 2.2 FACILITIES MANAGEMENT ORGANIZATION (FMO)



issues. The day-and-evening shift supervisor is expected to handle most issues to provide safe and efficient site-wide janitorial services. When assistance is needed, the general plant services manager and the FMO manager are called on for help.

In this instance, the employee expressed her concern that the work area was too hot with evening shift, first- and second-line supervisors, and the FMO Manager. The line manager and supervisors did not fully understand the extent of the employee's concerns. FMO attempted to further define the concerns by asking the employee to write down what she considered to be "too hot." The employee did not respond. The request was inappropriate because the employee was not the proper resource to clarify a medical condition, medical restriction, or define "too hot." They did not contact Health Services or Safety and Health Organizations because they interpreted the medical restriction to address heat stress only. (FMO has experience in conducting conventional heat stress work.) Additionally, the employee worked overtime in the months preceding and following the incident, resulting in confusing and intermingled health issues. FMO's previous experience dealing with heat stress situations and the employee's ability to work overtime contributed to FMO's failure to recognize that heat sensitivity of a specific individual can vary widely and that it necessitates input from knowledgeable disciplines.

Employee's concerns were not fully understood by management and additional support was not requested.

2.2.2 Health Services and Safety and Health Management Systems

Policies and Procedures

Policies and procedures relevant to this investigation are:

- DOE Order 5480.8A, "Contractor Occupational Medical Program."
- LMES Procedure MD-153, "Occupational Health Program." Responsibilities for the essential elements of the occupational health program are defined.
- Y-12 Procedure Y70-039, "Occupational Medical Program." Program requirements are defined.
- LMES Program Description SH-170PD, "Lockheed Martin Energy Systems Safety and Health Incident Reporting and Accident Investigation."

- LMES Policy and Procedure Guide 1.65, “Guidelines for Recording Occupational Illnesses and Injuries.”
- Y-12 Plant Shift Supervisors, “Quick Response Guide.” Guidelines are provided on response to illness or injury when Health Services is not staffed.

The Health Services staff understands and accepts the responsibility for documenting and distributing employee medical restrictions. When an employee reports to Health Services with an occupational or nonoccupational injury/illness, Health Services personnel make an evaluation of fitness to return to work with or without medical restrictions. If the employee requires medical restrictions to perform his/her work assignment safely, the medical restrictions are documented and distributed to the employee, supervision, and support staff.

Supervisors who need to understand a medical restriction better, consult with Health Services for clarification. Although Health Services receives calls from supervisors to clarify medical restrictions, they do not contact supervision to clarify medical restrictions that are more complex.

In addition to determining medical restrictions, Health Services completes an MIR when an employee claims an illness and/or injury is occupationally related. The MIR is used by LMES to begin the required classification for recordable illnesses and injuries. For off-shift activities, the preliminary information for an MIR is obtained by the emergency responders and relayed to Health Services via the PSS.

In this incident, upon the employee’s return to work, Health Services reviewed the hospital diagnosis and the employee’s medical history and determined that the illness was not occupationally related. This determination short-circuited the classification process. The normal classification process for LMES is through an employee’s initiation of an MIR at Health Services. The MIR is forwarded to the person within Safety and Health who has the responsibility for determining the recordability of the incident. This determination is done with all available information taken into account, including pertinent medical information from Health Services and the personal physician, Supervisor Incident Report (SIR), and walkthrough of the area. This process is separate from any workman’s compensation determination.

Medical restrictions are issued so that employees can perform their work assignments safely.

Supervisors are free to clarify medical restrictions with Health Services.

An MIR and new DOE Form 5484.3 (SIR) for this incident were completed on October 23, 1997, and the incident was classified by Safety and Health as an occupational illness on November 6, 1997.

In addition to the classification and recording of occupational injuries and illnesses and associated information, Safety and Health is responsible for providing safety and health support services for the Site. The FMO has safety and health professionals assigned to it who could have evaluated the employee's work areas and offered specific recommendations regarding work/rest regimes and task arrangement, but did not. Additionally, empirical data from an evaluation could have been used by both line management and Health Services for a thorough review of the work and medical conditions.

2.3 DOE OVERSIGHT

The DOE Y-12 Site Office is notified by the PSS of all significant daily events. DOE oversight of the contractor's response to such events is provided by the daily operational interaction between DOE and LMES and by program audits. The Site Office also reviews the monthly submission of DOE Form 5484.3, which categorizes all occupational illnesses and injuries and lost work day cases. This is an appropriate level of oversight and program management. The need for more detailed information related to this particular incident was recognized in a timely fashion by the site office when the DOE Employee Concern was sent to them for investigation/review. The Type B Investigation was initiated by their inquiry.

2.4 INCIDENT ANALYSIS

2.4.1 Barrier Analysis

A barrier analysis was conducted to identify barriers associated with the incident. The analysis examined administrative, management, and physical barriers and systems in place to isolate and avoid hazards. In this instance, the hazard is an environmental condition (heat) coupled with the employee's complex health condition. The occupational illness that occurred on June 19, 1997, could have been initiated by increased physiological stress (e.g., a hot work environment). The employee may have an elevated sensitivity to heat that is

An MIR for this incident was completed on October 23, 1997. It was classified as an occupational illness on November 6, 1997.

FMO did not ask Safety and Health staff to evaluate the employee's work area.

Administrative, management, and physical barriers were examined.

None of the identified barriers worked.

not common in the workplace. None of the identified barriers worked in this case. See Table 2.1.

2.4.2 Change Analysis

Change analysis was used to examine the impacts of change in the event. The events were analyzed for the specific incident and compared to an ideal situation; the differences between the two were noted, and the effects of the differences were evaluated. The process helped clarify the impact of changing runs on understanding the issues raised by the employee. Management did not realize the issues were confused and intermingled. See Table 2.2.

Change analysis pointed out that several changes in work locations confused the issues.

2.4.3 Contributing Causes

The **root cause** is the fundamental cause that, if eliminated or modified, would prevent recurrence of this and similar events. There are also **contributing causes** that individually did not cause the event but did increase the likelihood of the event and are important enough to be recognized as needing corrective action. The root cause of the occupational illness is that management did not recognize the extent and complexity of the employee's concerns. See Table 2.3

Management did not recognize the extent and complexity of the employee's concerns.

2.4.4 MORT Analysis

A mini-MORT was used to evaluate the specific events and management systems systematically. The occupational illness appears to be initiated by other health issues aggravated by the working conditions. The results of the mini-MORT are consistent with the other tools. The mini-MORT also helped to determine contributing causes.

2.4.5 Root Cause Analysis

Tier diagramming was used to determine root cause because the incident was relatively simple and easily understood. The approach began with the facts and moved up the tiers, using contributing causes to arrive at a root cause. See Table 2.4.

Table 2.1. Barrier Analysis Worksheet

Hazard	Barrier	Contributing Factors to Barrier Failure	Possible Root Causes of Failures	Loss or Potential Potential Loss	Evaluation
Impaired health employee in contact with “hot” work environment	Take medicine as prescribed	It was time to take medicine	Employee planned to take medicine on lunch break	A syncope event or hypertensive crisis	Employees are expected to take medicine as prescribed
	Understanding of and compliance with medical restrictions Self-pacing	Management and the employee had different understanding Health Services did not understand employee’s sensitivity to heat	Management and Health Services used a conventional definition for “heat stress” Management walkthrough did not include employee		Involve concerned parties early to ensure issues are identified Utilize Health Services to clarify restrictions
	Job monitoring and evaluation	Management did not see need to provide or request support from Health Services or Industrial Hygiene	Management did not recognize the complex issues		
	Involvement of Health Services staff	Health Services did not receive a request to clarify restriction	Management thought they understood the restriction		
	Management’s listening to employee indicators	Management thought they understood the employee Focused on “heat stress” definition	Employee health, medical restrictions, and job conditions were not adequately integrated		

Table 2.2. Change Analysis

Ideal Condition	Incident Condition	Difference	Effect
Healthy employee working in air-conditioned areas.	Employee with several medical conditions performing some work in non-airconditioned areas. Work location was changed several times and responsibilities were increased from previous long-term assignment.	Employee had health issues and may have forgotten to take her medicine on time. Work included some non-airconditioned areas. Work areas had changed and responsibilities had increased from previous long-term assignment.	Employee experienced a syncope; spent 5 days in the hospital and 18 days off work. Employee has filed a grievance and an employee concern.
Employee working on day shift with supervision and medical staff readily available.	Employee worked on evening shift when access to senior management and medical staff was limited to the early hours.	Only the evening shift supervisors were available. Medical staff was not on duty.	Health Services was not informed of the ambulance call. An MIR was not written until months later. Corrective actions within the line management organization were simplistic and incremental.
When needed, medical restrictions written in a clear and specific manner.	Medical restriction was written in non-specific terms.	Line management did not have an adequate understanding of the medical restriction.	Line management took a familiar but narrow interpretation of the medical restriction (focusing on the conventional definition of heat stress).
Receptive and engaged management system.	Management did not understand employee's complaint that "it is hot" and did not communicate with medical staff.	Management and the employee did not agree on the job-specific application of the medical restriction.	There was no recognized need to seek assistance, walk the run with the employee, or include other safety and health support.

Table 2.3. Root Cause and Contributing Causes

The Board identified a single root cause for this illness; however, because of the unique nature of this illness (combined with other medical conditions) and the uncertain effectiveness of specific preventive measures, there is no certainty that management could have prevented this illness.

Root Cause	Discussion
Management did not recognize the extent of the employee's concerns.	Management did not recognize the different aspects of and the degree of the employee's concerns due to the influence of contributing causes discussed below.
Contributing Causes	Discussion
Not fully understanding employee's health conditions	The employee has significant health conditions. The employee health conditions require proper and timely self-administration of several medicines. The medical records record infrequent examples of missed doses.
Permanent medical restriction terminology	The terminology of the permanent medical restriction (i.e., "cannot work in hot environments for extended periods - avoid heat stress situations," dated 7/18/95) allowed line management to apply the conventional definition of heat stress.
Job changes	Job locations changed twice in two weeks after a long-term assignment in the same location.
Work conditions	The new job assignment required working in some non-airconditioned areas during the summer.
Confusing and intermingled health issues and job assignments	Overtime work in non-airconditioned areas was accepted. Employee addressed other issues besides heat (e.g., handling broken glass, climbing stairs, walking outside, and bending).
Management team communication	The management team did not work well together to understand and address the employee's concerns. Management team communication during off-shift periods was limited to the early hours.
Management response to employee's issues	Management did not seek out staff support (e.g., Safety and Health, Health Services, Human Resources).

Table 2.4. Root Cause Analysis

Root Cause	Management did not recognize the extent of the employee's concerns.
Knowledge/ Accountability	Management thought they were addressing the issues and did not seek additional support or expertise.
Plans/Programs	Management did not integrate the employee's health, work restrictions, job conditions, feedback, and management expectations.
Procedures/ Communication	Health Services was not contacted for clarification of the restriction; management and the employee did not communicate effectively.
Facts/ Direct Causes	The employee may have forgotten to take her medicine on time; it was hot and portions of the run were not airconditioned; the run had changed; there were several medical restrictions; the employee had syncope.

3.0 CONCLUSIONS AND JUDGMENTS OF NEED

Conclusions are the synopsis of those facts and analytical results that the Board considers especially significant. Judgments of need are managerial controls and safety measures necessary to prevent or minimize the probability or severity of a recurrence. Judgments of need flow from the conclusions and are directed at guiding managers in developing corrective actions. Table 3-1 summarizes the Board's conclusions and judgments of need.

Table 3-1. Conclusions and Judgments of Need

Conclusion	Judgments of Need
<p>1. The management team, including expert staff resources (Health Services, Safety and Health, Human Resources, etc.) did not work well together and with the employee to understand and adequately address the employee’s concerns.</p>	<p>LMES needs to ensure that plant policy and general practice result in timely line management involvement of expert staff resources (Health Services, Safety and Health, Human Resources, etc.) and affected employee in dealing with difficult employee issues (e.g., nonspecific medical restrictions, employee concerns not reaching timely resolution).</p>
<p>2. The employee had various medical restrictions and had previously worked in a single location for three to four years before being reassigned twice in two weeks. Medical conditions, new work assignments, and summer conditions combined to create a confusing and intermingled set of issues.</p>	<p>When anticipating change and before multiple issues arise, LMES management needs to recognize and require early and frequent communications between affected employee and the management team.</p>
<p>3. The employee had significant medical problems that directly affected her work capability. This information was not adequately communicated by Health Services to responsible line managers.</p>	<p>LMES Health Services policy should require sufficient and timely information be provided to line management for individuals with complex medical issues. Those medical restrictions that are not specific should require direct discussions among line management, Health Services, and the involved employee.</p>
<p>4. Current guidelines (SH-170PD and “Quick Response Guide”) and practices for completing the MIR do not ensure that all potential occupational injuries and illnesses are properly submitted for classification.</p>	<p>LMES criteria for initiating an MIR need to be clear, understood, and consistently implemented by all those affected.</p>

4.0 BOARD SIGNATURES

Date: 12/01/97

Barry S. Willis
DOE Investigation Board Chairperson
Oak Ridge Operations
Oak Ridge National Laboratory Site Office

Date: 12/01/97

Cathy G. Stachowiak
DOE Investigation Board Member
Oak Ridge Operations
East Tennessee Technology Park Site Office

Date: 12/01/97

Mark S. Robinson
DOE Investigation Board Member
Oak Ridge Operations
Oak Ridge National Laboratory Site Office

APPENDIX A
APPOINTMENT MEMORANDUM FOR
TYPE B INVESTIGATION

memorandum

DATE: October 22, 1997

REPLY TO:
ATTN OF: SE-32:Mullins

SUBJECT: **TYPE B INVESTIGATION - EMPLOYEE OCCUPATIONAL ILLNESS, LOCKHEED MARTIN ENERGY SYSTEMS, INC., Y-12 SITE**

TO: Barry S. Willis, Deputy Site Manager for Operations, ER-12

You are hereby appointed Chairman of the Investigation Board to investigate the subject incident that came to DOE attention through a Lockheed Martin Energy Systems, Inc. ILMES), employee concern (see attachment). After initial review of the employee concern, Oak Ridge determined the illness to be occupational. Since the employee was hospitalized for 5 days, the incident meets investigation requirements for a Type B Investigation as defined by DOE Order 225.1.

You are to perform a Type B investigation of this incident and to prepare an investigation report. The report shall conform to the requirements detailed in DOE Order 225.1 and DOE G 225.1-1, Implementation Guide for Use with DOE 225.1, Accident Investigations. The scope of the investigation is to include, but is not limited to, analyzing causal factors and identifying root causes which resulted in the incident, and determining judgments of need to prevent recurrence. The Board will also focus on management roles and responsibilities, application of lessons learned from similar type accidents within the Department, and work planning, practices and procedures. If additional resources are required to assist you in completing this task, please let me know and it will be provided. You and members of the Board are relieved of your other duties until this assignment is completed.

The following employees have been appointed to serve as members of the Board:

Cathy Stachowiak, Safety and Health Program Manager, East Tennessee Technology Park Site Office, Member

Mark Robinson, Health Physicist, Oak Ridge National Laboratory Site Office, Trained Investigator

The Board will provide my office and Robert Poe, Assistant Manager for Environment, Safety, and Quality, with periodic reports on the status of the investigation and not include any findings or arrive at any premature conclusions until an analysis of all the causal factors have been completed. Draft copies of the report should be provided to LMES and appropriate ORO staff for factual accuracy review.

The final draft of the investigation report should be provided to me by November 21, 1997. Discussions of the investigation and copies of the draft report will be controlled until I authorize release of the final report.

James C. Hall
Manager

Attachment:
Employee Concern

cc w/attachment:

P. N. Brush, Acting EH-1, HQ, 7A-097/FORS

V. H. Reis, DP-1, 4A-019/FORS

G. S. Podonsky, EH-4, HQ, C-303/GTN

D. Vernon, EH-21, HQ/GTN

J. D. Jackson, DP-81, OR

Steve Wyatt, M-4, OR

R. W. Poe, SE-30, OR

R. D. Dempsey, DP-80, OR

W. T. Cooper, EH-24, OR

Steve Wyatt, M-4, OR